REMARKS

Applicants respectfully request consideration of the subject application. This Response is submitted in response to the Office Action mailed February 22, 2006. Claims 1-22 stand rejected. In this Amendment, claims 1, 7, 9, 11 and 17 have been amended and claims 5-6 have been cancelled. No new matter has been added.

Objections to the Drawings

The Examiner has objected to the drawings because Figures 1a-1e should be designated with a legend such as "Prior Art." Applicant has amended the drawings in accordance with the Examiner's suggestions. Accordingly, Applicant respectfully requests withdrawal of the objections to the drawings.

35 U.S.C. §§ 102 and 103 Rejections

The Examiner has rejected claims 1 and 20 under 35 U.S.C. § 102(b) as being anticipated by Lee, et al. (U.S. Patent No. 6,850,683, hereinafter "Lee"). The Examiner has rejected claims 4-5 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Wolf, et al. (Silicon Processing for the VLSI Era, Vol. 1, Lattice Press, 1986, hereinafter "Wolf"). The Examiner has rejected claims 3 and 22 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Ishida, et al. (U.S. Patent No. 4,695,122, hereinafter "Ishida"). The Examiner has rejected claims 6, 9, and 10 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, et al. (U.S. Patent No. 6,224,713, hereinafter "Hembree"). The Examiner has rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Lee in

view of Hembree, in further view of Li (U.S. Patent No. 5,976,767, hereinafter "Li"). The Examiner has rejected claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, in further view of Li, in further view of Wolf. The Examiner has rejected claims 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, in further view of Wolf. The Examiner has rejected claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Patel (U.S. Publication No. 2004/0240822, hereinafter "Patel"), in view of Newn, et al. (U.S. Patent No. 3,999,835, hereinafter "Newn"). The Examiner has rejected claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li, in further view of Ilardi (U.S. Patent No. 5,466,389, hereinafter "Ilardi"). The Examiner has rejected claims 16 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Lee. The Examiner has rejected claims 17 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li. The Examiner has rejected claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li, in further view of Liu, et al. (U.S. Patent No. 4,817,652, hereinafter "Liu").

Claim 1

As noted above, Applicants have amended claim 1 to include limitations similar to cancelled claims 5-6.

Applicants respectfully submit that Lee, Wolf and/or Hembree and combinations thereof do not teach or suggest the presently claimed invention.

Applicants respectfully submit it would be impermissible hindsight, based on Applicant's own disclosure, to combine Lee, Wolf and/or Hembree.

Lee is directed to a method of reducing scattering losses of waveguides by oxidizing the rough silicon core surfaces after the patterning process. Lee discloses that the already-fabricated waveguide core can be subjected to a wet chemical etch to smoothen the core/cladding interface, and discloses that anisotropic and isotropic etchants can be used.

Lee does not disclose submerging the waveguide into a wet etch solution to which sonic energy is applied. In addition, Lee does not disclose using the isotropic wet etch process to transform a waveguide having a trapezoidal anisotropic shape into a waveguide having a substantially rounded surface.

Wolf discloses wet etching and indicates that wet etching processes are generally isotropic. Wolf also discloses that particulates can be removed using ultrasonic scrubbing, in which wafers are immersed in a suitable liquid medium to which sonic energy is applied. Wolf discloses that the shock waves produced by the sonic agitation displace or loosen particulate matter.

Wolf does not disclose that the wet etch process can be used in forming waveguides. In addition, Wolf does not disclose that the combination of the wet etch process and sonic energy application can be used to transform a waveguide having a trapezoidal anisotropic shape into a waveguide having a substantially rounded surface.

Hembree is directed to a method and apparatus for ultrasonic wet etching of silicon. Hembree also discloses that the ultrasonic waves promote cavitation that mixes the etchant mixture on a microscopic level, and also assists in promoting bubble detachment.

Hembree also does not disclose that the wet etch process can be used in forming waveguides. In addition, Hembree also does not disclose that the combination of the wet etch process and sonic energy application can be used to transform a waveguide having a trapezoidal anisotropic shape into a waveguide having a substantially rounded surface.

In contrast, in embodiments of the presently claimed invention, sonic energy is applied to a wet etch solution in which a waveguide is submerged to transform the waveguide from having a trapezoidal anisotropic shape to a waveguide having a substantially rounded surface.

As explained in the present specification at paragraphs [0015] – [0016] and [0018] – [0021], application of sonic energy to a wet etch solution may reduce the viscosity of the wet etch solution, which is valuable because the isotropic properties of the wet etch may be lost with increased viscosity of the wet etch solution. Without the sonic energy, the viscosity of the wet etch solution would be reduced by raising the temperature of the wet etch solution. However, when the temperature of the wet etch solution is increased, the etch rate is also increased, which reduces the control of the etching process and causing variation between the etching of different waveguides on a single substrate. With the use of sonic energy, the wet etch may be performed at a lower temperature and thus at a slower etch rate.

Figures 3h and 3i of the present specification show exemplary rounded waveguides in accordance with certain embodiments of the presently claimed invention.

The cited art does not teach or suggest the advantages of using sonic energy to smooth waveguides, nor does the cited art teach or suggest forming a waveguide having a substantially rounded surface.

Claim 17

Applicants do not admit that Patel is prior art and reserve the right to swear behind this reference at a later date. Regardless, Applicants respectfully submit that the pending claims are patentable over the above reference.

Applicants respectfully submit that Patel, Wolf and Li and combinations thereof do not teach or suggest the presently claimed invention.

Applicants respectfully submit it would be impermissible hindsight, based on Applicant's own disclosure, to combine Patel, Wolf and Li.

Patel is directed to techniques to round the edges/corners of silicon material along the extent of a waveguiding region. In Patel, a sacrificial polysilicon layer is deposited to completely cover the waveguiding structure. The founded features in the sacrificial polysilicon layer are transferred into the waveguide structure by etching the sacrificial polysilicon layer. The etching process results in the formation of sidewall fillets disposed on either side of the waveguiding structure.

Patel does not disclose etching the waveguide. Patel merely discloses etching a sacrificial layer to form a waveguide having rounded edges.

As discussed above, Wolf discloses wet etching and indicates that wet etching processes are generally isotropic. Wolf also discloses that particulates can be removed using ultrasonic scrubbing, in which wafers are immersed in a suitable liquid medium to which sonic energy is applied. Wolf discloses that the shock waves produced b the sonic agitation displace or loosen particulate matter.

As noted above, Wolf does not disclose wet etching a waveguide as presently claimed.

Li is directed to a process for selectively etching polysilicon using an ammonia solution etch to selectively remove a silicon containing layer. Li also discloses that megasonics can be used with the ammonium hydroxide etch to selectively remove the silicon containing layer at a faster rate.

Li does not disclose etching a waveguide as presently claimed.

In contrast, in embodiments of the presently claimed invention, sonic energy is applied to a wet etch solution to transform a waveguide having a trapezoidal anisotropic shape into a waveguide having a substantially rounded surface.

As discussed above with reference to claim 1, there are certain advantages to applying sonic energy to the wet etch solution that are not described in the cited art. Further, as described above with reference to claim 1, the cited art fails to teach or suggest using a wet etch process to transform a waveguide having a trapezoidal anisotropic shape into a waveguide having a substantially rounded surface.

Thus, the cited art fails to teach or suggest all of the limitations of independent claims 1 and 17. Claims 2-4, 7-16 and 18-22 depend, directly or indirectly, from one of the forgoing independent claims.

Applicant, accordingly, respectfully requests withdrawal of the rejections of claims 1 and 20 under 35 U.S.C. § 102(b) as being anticipated by Lee, the rejections of claims 4-5 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Wolf, the rejections of

claims 3 and 22 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Ishida, the rejections of claims 6, 9, and 10 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, the rejections of claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, in further view of Li, the rejections of claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, in further view of Li, in further view of Wolf, the rejections of claims 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Lee in view of Hembree, in further view of Wolf, the rejections of claim 2 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Newn, the rejections of claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li, in further view of Ilardi, the rejections of claims 16 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Lee, the rejections of claims 17 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li, and the rejections of claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Patel, in view of Wolf, in further view of Li, in further view of Liu.

Applicant respectfully submits that the present application is in condition for allowance. If the Examiner believes a telephone conference would expedite or assist in the allowance of the present application, the Examiner is invited to call Jennifer Hayes at (408) 720-8300.

Please charge any shortages and credit any overages to Deposit Account No. 02-2666. Any necessary extension of time for response not already requested is hereby requested. Please charge any corresponding fee to Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

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IN THE DRAWINGS

Applicant submits Substitute Sheets Nos. 1-2 containing Figures 1a-1e and reflecting corrections made to Figures 1a-1e.